2000 Paper 13 Question 4

Computer Graphics and Image Processing

Give an algorithm for drawing the part of a circle which lies in the first octant. Assume that the circle has integer radius and is centered at the origin. Assume that you have a function $setpixel(x, y)$ which turns on pixel (x, y). [10 marks]

Derive a matrix, or a product of matrices, to perform a clockwise 2D rotation of arbitrary angle, θ, about an arbitrary point, (x_c, y_c). [4 marks]

Provide an algorithm to ascertain whether the Bezier curve defined by $P_1P_2P_3P_4$ lies within some tolerance, ϵ, of the straight line segment, $\overline{P_1P_4}$, which joins the Bezier curve's end points. Your algorithm must return *false* if the Bezier curve is outside the tolerance; it must return *true* if the curve is well inside the tolerance; it may return either *true* or *false* if the curve is inside, but not well inside, the tolerance. [6 marks]